U.S. Energy Information Administration

‹ Countries

Kazakhstan

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Background

Kazakhstan, an oil producer since 1911, has the second largest oil reserves as well as the second largest oil production among the former Soviet republics after Russia.

With total liquids production estimated at 1.6 million barrels per day (bbl/d) in 2012, Kazakhstan is a major producer; however, key to its continued growth in liquids production will be the development of its giant Tengiz, Karachaganak, and Kashagan fields. Furthermore, development of additional export capacity will be necessary for production growth.

Rising natural gas production over the last decade has transformed Kazakhstan from a net gas importer to a country that as of 2011 was self-sufficient. Natural gas development has lagged oil due to the lack of domestic gas pipeline infrastructure linking the western producing region with the eastern industrial region, as well as the lack of export pipelines.

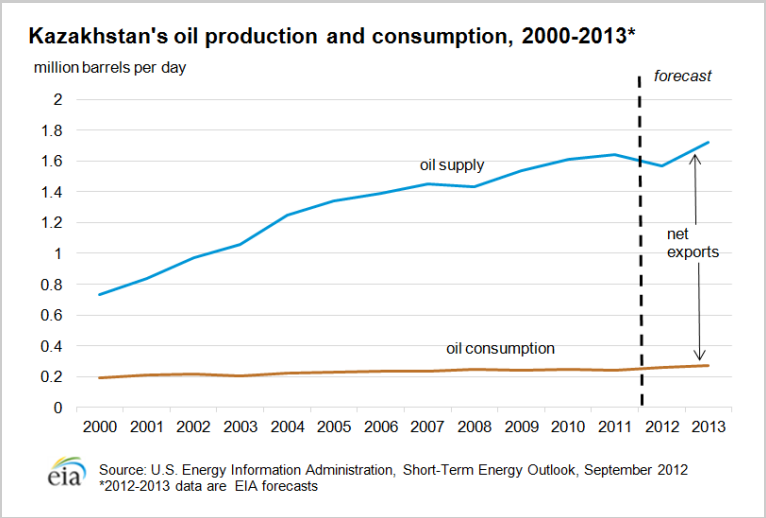
Kazakhstan is land-locked and lies a great distance from international oil markets. The lack of access to a seaport makes the country dependent mainly on pipelines to transport its hydrocarbons to world markets. It is also a transit state for pipeline exports from Turkmenistan and Uzbekistan. Neighbors China and Russia are key economic partners, providing sources of export demand and government project financing.

Oil

Kazakhstan's current production is dominated by two giant fields: Tengiz and Karachaganak, which produce about half of Kazakhstan's total output.

Kazakhstan's proven oil reserves were estimated at 30 billion barrels by the *Oil and Gas*

Journal in January 2012. The country's main oil reserves are located in the western part of the country, where the 5 largest onshore oil fields (Tengiz, Karachaganak, Aktobe, Mangistau, and Uzen) are located. These onshore fields account for about half of current proven reserves, while the offshore Kashagan and Kurmangazy oil fields, in Kazakhstan's sector of the Caspian Sea, are estimated to contain at least 14 billion barrels, with Kashagan accounting for around 9 billion barrels.



Sector organization

In March 2010, the Ministry of Energy and Mineral Resources was dissolved and replaced by the Ministry of Oil and Gas and the Ministry for Industry and New Technologies, which are responsible for the petroleum industry and mining, respectively. The realignment of the ministries was designed so that the state can play a more central role in the oil and gas sector. With this realignment, KazMunaiGas (KMG) is no longer involved in the regulation of the sector, effectively removing the potential for conflicts of government and commercial interests.

In addition to the above-mentioned ministries, additional regulatory bodies involved in the oil sector include the Ministry of Finance (monitors transfer pricing, reporting of revenues, and taxes), Ministry of Environmental Protection (monitors compliance with environmental legislation), and Ministry on Emergency Situations (monitors compliance with health and safety regulations).

The national oil and gas company, KMG, was created in 2002 to represent the state's interests in Kazakhstan's oil and gas industry. Rising oil production has been the result of an influx of foreign investment into Kazakhstan's oil sector since 1991. However, KMG plays a growing role in oil and gas sector development as the government now reserves a majority stake for KMG in all new projects and joint ventures.

KMG has a number of subsidiaries, including KMG Exploration and Productions (upstream operator), KazMuaniTeniz (offshore oil and gas operations), KazTransOil (oil pipeline operator), and KazTransGas (gas pipeline operator).

KMG holds equity interests in Kashagan (15 percent) and Tengiz (20 percent), as well as interests ranging between 15 and 100 percent in many of the onshore projects. It holds at least 50 percent in most of the offshore blocks.

Kazakhstan's Law on Subsoil and Subsoil Use governs the transfer of subsoil use rights and was amended in 2005 to give the state the basis to exercise pre-emption rights on any oil assets put up for sale in the country, allowing KMG to buy them and thus secure stakes in several of the country's biggest projects. The law was amended again in 2007 to allow the state to make retrospective changes to any existing oil contracts or even break the contracts if they are deemed a threat to the country's security. The June 2010 amendment established strict local content requirements for oil and gas contracts, and formally abolished the production-sharing agreements (PSAs).

Joint ventures are now the most common type of investment. The Kazakh government's decision to offer exploration blocks to KMG first, letting the state firm negotiate with potential partners rather than issuing blocks via an open licensing process, initially dampened foreign oil company interest. However, KMG signed exploration agreements with Total and Statoil in June 2010 for two offshore Caspian blocks. State-to-state deals with state-owned oil companies, particularly Russian and Chinese, are prevalent. In August 2010, the government announced the re-introduction of oil export duties and increased them in January 2011. Export duties were first introduced in 2008 and then suspended in January 2009. This affects all oil exporters operating in Kazakhstan, with the exceptions of those that include a tax stabilization clause in their contracts.

Production

Kazakhstan's oil production reached 1.64 million barrels per day (bbl/d) in 2011; however, data for 2012 thus far indicate that liquids production in Kazakhstan will be slightly lower for the year at 1.60 million bbl/d. Kazakhstan's production has seen an impressive expansion since 1995 with the help from foreign oil companies. It surpassed the 1.0 million bbl/d production level in 2003 and steadily grew to be the second-largest oil producer in the Former Soviet Union, second only to Russia.

Kazakhstan has seen a significant increase in foreign investment following its independence and there are now a number of international oil companies that are involved in the country's major projects. KMG had previously held significant stakes in these projects, but over the past few years it has taken steps to consolidate its holdings in some projects while selling off its stake in others.

Chevron holds the largest stake of any foreign international oil company (IOC) and is the largest producer in the country. It has a 50-percent stake in the Tengiz field and a 20-percent stake in the Karachaganak field. Chevron has been operating in Kazakhstan for decades, having entered the country during the Soviet era.

In addition to Chevron, other IOCs operating in Kazakhstan are ExxonMobil, Shell, Total, ConocoPhillips, Eni, CNPC, PetroChina, LUKoil, as well as a number of other smaller international oil companies.

Largest currently producing oil fields

Tengiz is currently Kazakhstan's largest producing oil field with an output of approximately 520,000 bbl/d through June 2012, accounting for nearly a third of total production. The field is located onshore northwestern Kazakhstan and it is the world's deepest operating giant field at 12,000 feet. It has been in development since 1993 by the Tengizchevroil (TCO) joint venture, which includes Chevron (50 percent), ExxonMobil (25 percent), KMG (20 percent), and LukArco (5 percent). According to Wood Mackenzie, production at Tengiz is expected to

increase to 844,000 bbl/d by 2020. Tengiz output is currently exported through the Caspian Pipeline Consortium (CPC) oil pipeline, which runs from Tengiz to Novorossiysk, Russia on the Black Sea.

Karachaganak, also onshore northwestern Kazakhstan close to the Russian border, produced 244,000 bbl/d of condensate between January and June 2012, accounting for about 15 percent of total production. According to Karachaganak Petroleum Operating (KPO), the field holds reserves of around 9 billion barrels of oil and gas condensate and 47 trillion cubic feet of natural gas. The field is operated by the KPO consortium under a PSA. KPO includes BG and Eni, (each 32.5 percent), Chevron (20 percent), and Lukoil (15 percent). Wood Mackenzie expects that production from Karachaganak is expected to increase to 340,000 bbl/d by 2020.

Uzen oil field, located in southwestern Kazakhstan in the Mangistau region, produced approximately 100,000 bbl/d in the first six months of 2012. It is 100 percent owned by KMG and has been in operation since 1961. The Uzen field is undergoing rehabilitation while the adjacent Karamandybas field is being developed as these two fields are expected to boost production somewhat in the future.

Mangistau oil field, in the same region, produced 117,000 bbl/d between January and June 2012. It is operated jointly by KMG and China National Petroleum Corporation (CNPC).

Annual Liquids Production by Field, thousand barrels per day

	2010	2011
Tengizchevroil Area	611	609
Karachaganak	225	235
CNPC AktobeMunaiGas	126	130
UzenMunaiGas Fields	121	111
Mangistaumunaigaz Fields	115	114
Kazgermunai Fields	68	63
Turgai Petroleum Fields	61	53
EmbaMunaiGas Area	57	55
Buzachi North	37	38
Karazhanbas	36	37
Other Fields	242	254

Note: Due to the difference in sources, the total may not add up to the total production published in EIA's Short-Term Energy Outlook for 2010 and 2011. Source: Wood Mackenzie

Fields under development

The Kashagan field, believed to be the largest known oil field outside the Middle East and the fifth largest in the world in terms of reserves, is located off the northern shore of the Caspian Sea near the city of Atyrau. The field is being developed by the North Caspian Operating Company (NCOC) consortium. The NCOC PSA is led by KMG, Eni, ExxonMobil, Shell, and Total, each with a 16.8-percent share; ConocoPhillips with an 8.40-percent share; and Inpex at 7.56 percent. The field's recoverable reserves are estimated at 11 billion barrels of oil. The timetable for production startup has been pushed back to 2013, some 8

years after the original scheduled startup date of 2005. Initial production from Phase I is projected at 110,000 in 2013 with production of 406,000 bbl/d in 2020.

Much of the repeated delays have been due to cost overruns associated with the field's adverse operating environment. The Kashagan field presents particular challenges for its developers: it contains a high proportion of natural gas under very high pressure, the oil contains large quantities of sulfur, and the offshore platforms required construction that can withstand the extreme weather fluctuations in the northern Caspian Sea. Because the Kashagan field lies in shallow water, drilling and extraction operations will proceed from artificial islands. The timing of Phase II will also determine the timing of construction of new refining and export capability at Kuryk. Existing pipelines to Russia and China will only be able to handle Phase I output. Rail will also be used to transport Phase I volumes.

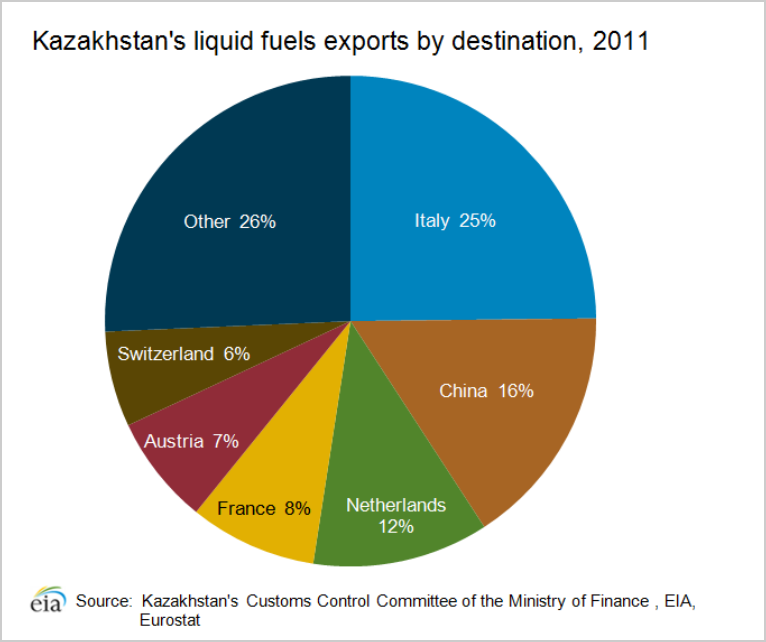
Exports

Kazakhstan is an important exporter of light, sweet crude oil. In 2011, Kazakhstan's net total liquids exports totaled approximately 1.4 million bbl/d with current infrastructure delivering it to world markets by pipelines to the Black Sea via Russia; by barge and pipeline to the Mediterranean via Azerbaijan and Turkey; by barge and rail to Batumi, Georgia on the Black Sea; and by pipeline to China.

According to Kazakhstan's Customs Control Committee of the Ministry of Finance, the largest share of its exports were destined for Italy in 2011 (at about 346,000 bbl/d) of which about 60,000 bbl/d was crude oil, as reported by Eurostat. Other notable importers of Kazakhstan's liquid fuels included China, the Netherlands, and France. The United States imported about 14,000 bbl/d in 2011 or about 1 percent of Kazakhstan's total exports.

Kazakhstan's exports likely will expand in the coming years, as new fields, particularly Kashagan, come online. However, the rapid growth of oil production and exports will require an expansion of export capacity.

Most of the current pipeline system was developed as part of the Soviet system, and its goal was to maximize transport of oil for Russia. Following the break-up of the Soviet Union, Kazakhstan was wholly dependent on Russia for its exports, giving Russia complete control over Kazakhstan's exports. Over time, however, Kazakhstan has been able to reduce its dependence on Russia's infrastructure by utilizing trans-Caspian tankers and rail, and by building a pipeline to China. Still, a majority of its exports have to be shipped via Russia's pipelines.



Oil pipelines

Kazakhstan's pipeline system is operated by the state-run KazTransOil, a subsidiary of KazMunaiGas, which runs approximately 5,300 kilometers. Development of additional capacity, particularly export capacity that would remove Kazakhstan's dependence on Russia, is key to its future ability to increase production.

Caspian Pipeline Consortium (CPC)

The Caspian Pipeline Consortium (CPC) oil pipeline was commissioned in 2001 and runs 940 miles from the Tengiz oil field to the Russian Black Sea port of Novorossiysk. The consortium's four largest shareholders are: Transneft (24 percent), KMG (19 percent), Chevron (15 percent), and LukArco (12.5 percent). The pipeline consists of refurbished Soviet-era pipeline links along the Caspian and newly constructed components along the line. The consortium transported an average of 684,000 bbl/d of crude oil in 2011, including 608,000 bbl/d from Kazakhstan and 76,000 bbl/d from Russia. In addition, approximately 53,000 bbl/d of Tengiz crude was discharged at Atyrau, Kazakhstan, for loading onto rail cars. In 2011, CPC partners began work to expand the pipeline capacity to 1.4 million bbl/d. The project will be implemented in three phases, with capacity increasing until 2016. The expansion is expected to provide additional transportation capacity to accommodate increased production from Tengizchevroil.

Kazakhstan-China Pipeline

The Kazakhstan-China oil pipeline spans 1,384 miles, running from Atyrau port in northwestern Kazakhstan to Alashankou in China's northwest Xinjiang region, and has a capacity of 240,000 bbl/d of crude. The pipeline is currently being expanded, which would increase its capacity to 400,000 bbl/d. The additional capacity will be used to transport at least some Kashagan oil. The pipeline is a joint venture between CNPC and KMG.

The pipeline was built in segments. The most recently completed segment, the 492-mile Kenkiyak-Kumkol (Phase 3) started commercial operations on October 6, 2009, and connects the Kenkiyak-Atyrau pipeline (Phase 1) to the Atasu-Alashankou pipeline (Phase 2), online since 2006. The cross-border section connects to CNPC/PetroChina's crude oil pipeline system in northwest China. Phase 1, the Kenkiyak-Atyrau pipeline, was the first oil

pipeline built in Kazakhstan after independence. This line was tied into the Kazakhstan-China pipeline and its direction of flow was reversed, now running from Atyrau to Kenkiyak.

Uzen-Atyrau-Samara Pipeline

Kazakhstan's other major oil export pipeline, from Atyrau to Samara, is a northbound link to Russia's Transneft distribution system, which provides Kazakhstan with a connection to world markets via the Black Sea. The line was upgraded in 2009 by the addition of pumping and heating stations and currently has a capacity of approximately 600,000 bbl/d. Before the completion of the CPC pipeline, Kazakhstan exported almost all of its oil through this system.

Baku-Tbilisi-Ceyhan

The Baku-Tbilisi-Ceyhan (BTC) pipeline is a 1 million bbl/d capacity line in neighboring Azerbaijan, which came online in 2006. Kazakhstan has a contract with Azerbaijan and the BTC Pipeline Company to supply up to 500,000 bbl/d of oil via the BTC pipeline. Kazakh oil supplies were loaded into the BTC for re-export for the first time in October 2008. Oil supplies are delivered by tanker across the Caspian to Baku.

Future and proposed developments

Development of Kashagan and other future projects require significant expansion of Kazakhstan's export capacity. To this end, Kazakhstan is promoting the Kazakhstan Caspian Transportation System (KCTS), which includes the construction of an 830-kilometer, 600,000 bbl/d capacity onshore pipeline from Eskene in western Kazakhstan to Kuryk on the Caspian near Aktau, where a new 760,000-bbl/d oil terminal is to be built. This system also includes a maritime link to Baku, Azerbaijan, new port facilities, and a transfer station in Baku, where the crude oil will be put into an expanded BTC pipeline to Turkey. KCTS is still only a proposal and given the size of the project, it would likely take until 2023 to complete. Other options include expanded transportation capacity to China. In August 2012, CNPC officials reported that the company is considering building a second crude oil pipeline to source volumes from the Caspian Sea region.

Other proposals include the construction of the Trans-Caspian oil pipeline, which would provide a western export route for both Kazakhstan and Turkmenistan. Additionally, the Kazakhstan-Turkmenistan-Iran pipeline has been proposed for a number of years, however continued strained relations with Iran make this project unlikely to be realized any time soon.

Rail and Sea Exports

Kazakhstan has an extensive rail network, which it increasingly used to transport liquid fuels both for domestic consumption and for exports. According to Wood Mackenzie, Kazakhstan has the capacity to export about 340,000 bbl/d of oil via rail. Tengizchevroil is the largest oil user of the rail network. The increasing use of rail network for oil transportation has had an effect on the cost, as price of rail has increased since the 1990s, making it the most expensive transportation option.

Two main ports used for oil exports are Aktau and Semey. Aktau is located in the Caspian Sea and has a loading capacity of 240,000 bbl/d of oil and oil products. The port has four berths capable of accommodating 12,000 tonne tankers.

Semey is located on the Irtish river in the northeastern part of the country. The port is important because during summer months, ship traffic can travel the entire length of the Irtish and Ob rivers to the Arctic Ocean and connect to the rail network.

In addition to Aktau and Semey, a smaller port of Atyrau is also operational. The port can accommodate barges of up to 120 tonnes, however this port is ice bound in the winter. It is located at the northern coast of the Caspian Sea.

Downstream and refining

Kazakhstan had a crude oil distillation capacity of 345,100 bbl/d as of January 1, 2012, according to the *Oil and Gas Journal*. There are three oil refineries in the country: Pavlodar, Atyrau, and Shymkent.

The Pavlodar refinery is supplied mainly by a crude oil pipeline from western Siberia, since Russian supplies are well placed geographically to serve that refinery. It processed approximately 100,000 bbl/d in 2010. Currently, the refinery is undergoing a reconstruction and modernization, which is due to be completed by the end of 2014.

The Atyrau refinery runs solely on domestic crude from northwest Kazakhstan and it processed about 90,000 bbl/d in 2012. The Shymkent refinery currently uses oil from the oil fields at Kumkol and the nearby area in central Kazakhstan. It refined approximately 95,000 bbl/d in 2010.

Despite being a significant oil exporter, Kazakhstan experiences regional and seasonal oil product shortages. Because most of the country's oil and gas is produced in the western part, its industrialized northern and southern regions (lacking pipeline connections to the western oil and gas fields) rely on imports from neighboring Russia and Uzbekistan, respectively. Until recently, the refining sector in Kazakhstan had not received the high levels of foreign direct investment that other parts of the oil sector have. Since domestic prices for refined products have remained low, oil producers have more incentive to export crude oil to international markets instead of refining it locally.

Natural gas

Most of Kazakhstan's natural gas reserves comprise associated gas and are located in just four fields: Karachaganak, Tengiz, Imashevskoye, and Kashagan.

In January 2012, the Oil and Gas Journal estimated Kazakhstan's proven natural gas reserves at 85 trillion cubic feet (Tcf). Natural gas production in Kazakhstan is almost entirely associated gas. Most of Kazakhstan's natural gas reserves are located in the west of the country, with about 80 percent of total natural gas reserves located in four fields: Karachaganak, Tengiz, Imashevskoye, and Kashagan.

Production

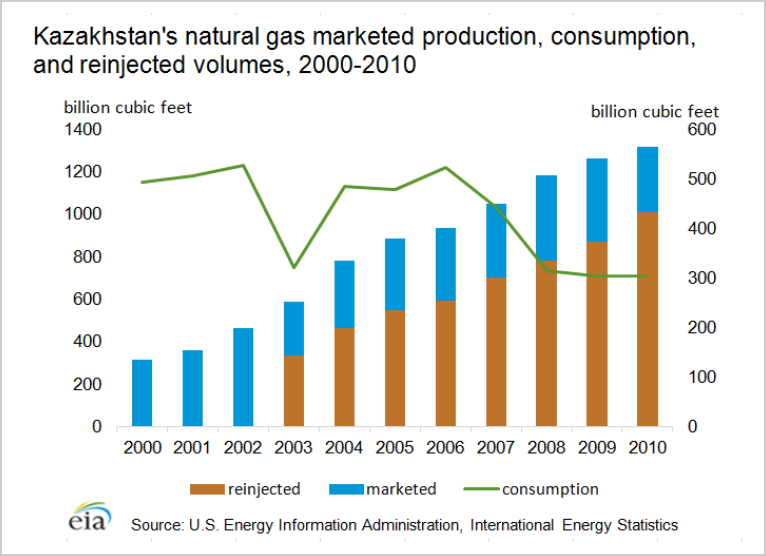
Annual marketed natural gas production has been trending upward from 314 billion cubic feet (Bcf) in 2000 to 388 Bcf in 2009, before it decreased slightly in 2010. While total gross gas production was 1.3 Tcf in 2010, 75 percent of the gas produced was reinjected into oil

fields to enhance production. The two largest natural gas producing fields are also the largest oil producing fields.

The Karachaganak oil and gas field produced approximately half of Kazakhstan's total gross gas production, totaling about 650 Bcf in 2010. Oil and Gas Journal reported that its production jumped to 784 Bcf in 2011. Wood Mackenzie expects that dry gas production from the Karachaganak field will reach 775 Bcf in 2015 and 1.3 Tcf in 2020.

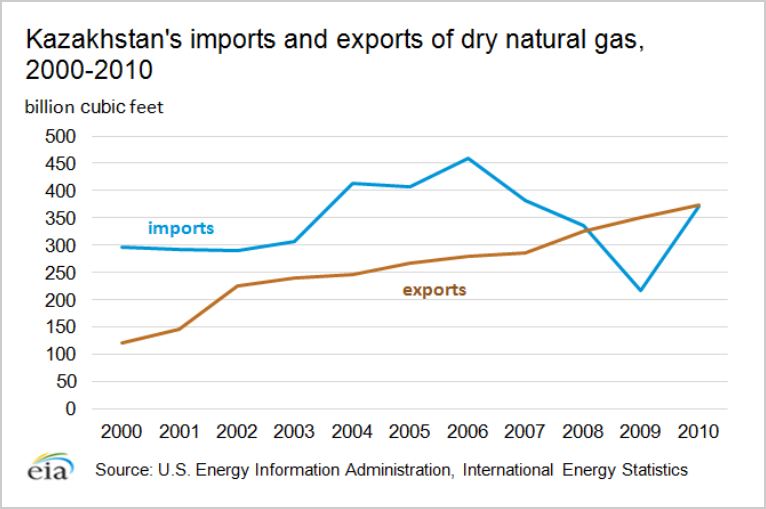
The Tengiz oil and gas field produced approximately 300 Bcf gross natural gas during 2011, of which 114 was dry gas production, according to Chevron. According to Wood Mackenzie projections, Tengiz will continue to play a significant role in Kazakhstan's gas production and will reach 623 Bcf of dry gas in 2015.

The remainder of gas produced in Kazakhstan came from other smaller fields. Development of the Kashagan and Imashevskoye fields is important for Kazakhstan's energy security, as gas output from these fields is geared to boost domestic gas supplies and to provide further volumes for enhanced oil recovery. These two fields together are expected to provide more than 1.1 Tcf in dry gas by 2020.



Imports and exports

Since 2008, Kazakhstan has been producing sufficient volume of dry natural gas to satisfy its domestic demand. However, due to the lack of proper infrastructure linking the demand centers to production areas, the country depends on gas imports to meet domestic demand. The domestic pipeline system is underdeveloped, and Kazakhstan's gas reserves in the west and population centers in the north, east, and south are not connected.



Natural gas pipelines

Kazakhstan has two separate domestic natural gas distribution networks, one in the west, which services the country's producing fields, and one in the south, which mainly delivers imported natural gas to the consuming regions. The lack of internal pipelines connecting Kazakhstan's natural gas-producing areas to the country's industrial belt between Almaty and Shymkent has hampered the development of the country's natural gas resources. Southern Kazakhstan receives much of its natural gas supplies from Uzbekistan via the Tashkent-Shymkent-Bishkek-Almaty pipeline even as the country exports gas from its northwestern region. KazTransGas, a subsidiary of KMG, controls and manages the country's gas pipeline transportation system.

Kazakhstan's pipeline network consists of 11,000 kilometers of pipeline, 22 compressor stations, and three undergrounds storage facilities. The main pipelines are the Central Asia Center pipeline, the Bukhara-Ural pipeline, Tashkent-Almaty pipeline, and the Turkmenistan-China pipeline.

Kazakhstan currently serves mainly as a transit country for natural gas pipeline exports from Uzbekistan and Turkmenistan to Russia and China.

Central Asia Centre Pipeline (CAC)

The two branches of the Central Asia Centre (CAC) gas pipeline, controlled by Gazprom, meet in the southwestern Kazakh city of Beyneu before crossing into Russia at Alexandrov Gay and feeding into the Russian pipeline system. The eastern branch of the pipeline, which has a throughput capacity of 2.2 Tcf, originates in the southeastern gas fields of Turkmenistan. The western branch (120 Bcf), originates on the Caspian seacoast of Turkmenistan. Almost all Turkmen and Uzbek gas is delivered via the eastern branch, as the western branch is more than 35 years old and not all of it has been renovated, causing periodic problems.

Bukhara-Urals Pipeline

A transit gas pipeline from Uzbekistan via Kazakhstan to Russia, this pipeline has capacity of 706 Bcf, but it is largely idle. It has several smaller pipelines as well as the underground storage facility that are connected to the mainline.

Bukhara-Tashkent- Bishkek-Almaty Pipeline

An import and transit gas pipeline that provides gas supplies from Uzbekistan to Kazakhstan's main southern population centers, this pipeline has a capacity of 160 Bcf. Between Shymkent and Almaty, the line crosses Kyrgyz territory to supply Bishkek, the Kyrgyz capital. The Poltoratskoye and Akyr-Tobe underground gas storage facilities are located on the line.

Future pipeline developments

Kazakhstan's central objective related to the natural gas sector is to develop a domestic natural gas system that would interconnect all of the country's regions, particularly its producing and consuming areas. Development of the domestic system would effectively remove the need for imports from Uzbekistan. Currently, five of the fourteen regions in Kazakhstan are not connected to the pipeline grid. While a long-term goal to connect these regions exists, the cost and availability of alternate sources of energy such as LGP and coal make this uneconomical at the present time.

Beineu-Bozoi-Akbulak Pipeline

The government is currently prioritizing the Beineu-Bozoi-Akbulak pipeline, which is intended to connect Kazakhstan's demand centers with its supply and to allow exports to China. The pipeline is expected to be completed by the end of 2015 with a capacity of 1 Bcf.

Sources

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